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USE OF MNEMONICS IN TRAINING MATERIALS. A GUIDE FOR TECHNICAL W--ETC(U)
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T A E G REPORT
NO. 60

USE OF MNEMONICS IN TRAINING MATERIALS:
A GUIDE FOR TECHNICAL WRITERS

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JULY 1978



TRAINING ANALYSIS AND EVALUATION GROUP

ORLANDO, FLORIDA 32813

TAEG Report No. 60

USE OF MNEMONICS IN TRAINING MATERIALS:
A GUIDE FOR TECHNICAL WRITERS

Richard Braby
J. Peter Kincaid

with the assistance of
James A. Aagard

Sponsored by

Chief of Naval Education and Training

and the

David W. Taylor Naval Ship Research and Development Center,
Naval Technical Information Presentation Program

July 1978

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report is a guide for incorporating different mnemonic techniques into the training curriculum. It is intended mainly for those responsible for the production of written training materials; classroom instructors should also find it useful. The Interservice Procedures for Instructional Systems Development call for the use of mnemonics in curriculum development. This report provides guidelines for choosing when to use mnemonics, which types of mnemonics to use, and how to develop each type of mnemonic. It contains a		

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description of nine techniques including several first letter mnemonics, rhymes as mnemonics, patterns and graphics as mnemonics and such special techniques as stories and the peg word method. It is filled with examples pertinent to Navy training including three complete sets of mnemonics for the teaching of: (1) Morse Code, (2) Signal Flags, and (3) Orders to the Sentries.

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Mr. Archie Poole, Chief Illustrator, Technical Data Management Branch, Naval Training Equipment Center, Orlando, Florida, and Mr. George Knapp of the same branch created the many illustrations contained in this report.

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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
I	INTRODUCTION.	3
	Objective	4
	Organization of the Report.	4
II	MNEMONICS TECHNIQUES FOR TECHNICAL TRAINING MATERIALS	5
	What are Mnemonics?	5
	When to Use Mnemonics	5
	When Not to Use Mnemonics	7
	Nine Mnemonic Techniques.	7
	Choosing Verbal or Visual Mnemonics	13
III	THE TRAINING PACKAGE.	15
	Acronyms.	15
	Acrostics	16
	Rhymes.	20
	Alliterations	22
	Patterns.	24
	Graphics.	27
	Stories	30
	Association Chains.	32
	Peg Word Method	36
	BIBLIOGRAPHY.	41
	APPENDIX A - Morse Code Mnemonics	43
	APPENDIX B - Navy Signal Flag Mnemonics	49
	APPENDIX C - Basic Exercises for Learning Sentry Duties	59

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Decision Tree for Determining if Mnemonics Should Be Used . . .	6
2	Decision Tree for Determining the Relevancy of Various Mnemonic Techniques	14

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Types of Mnemonics.	8

SECTION I

INTRODUCTION

A mnemonic is a special type of memory aid in the form of familiar words (or images) that can be associated with information to be memorized. The memory aid is easily recalled when needed and serves as a mediator to trigger the recall of the "difficult to remember" information. The use of a mnemonic makes it easier to both learn and recall numbers, codes, symbols, lists, and other types of specific information.

For many years mnemonics were regarded merely as tricks or gimmicks useful primarily for staged demonstrations. Unfortunately, this reputation has resulted in a lack of attention to the scientific basis of these techniques. Actually, mnemonics are based upon principles of learning--meaningfulness, association, imagery, and attention--and should be treated as legitimate aids for learning.

Useful mnemonics are usually not easily developed by technical writers. Part of the difficulty is that they are based upon mental associations, and these associations are a characteristic of, and peculiar to, the individual developing the mnemonic. When memorizing, individuals are likely to generate unique associations based on their past learning histories. Mnemonics developed in this manner are the most effective type of memory aid. Many students use their own mnemonics when confronted with difficult memory tasks. Others lack either the skill or motivation to do this. However, most instructors and students find it difficult to create effective mnemonics for classroom use. Development of effective mnemonics takes considerable time, skill, and effort; it is most economically done by technical writers reaching a large readership. A few technical writers effectively using mnemonics can significantly improve the training of many students.

"Standard" mnemonics need to be developed by the authors of training material for use by all those using the material. While they will not contain the optimal associations for each individual, they will be effective for group use.

Approved Navy procedures require the use of standard mnemonics in Navy training materials (e.g., NAVEDTRA 106A, Interservice Procedures for Instructional Systems Development). Even so, mnemonics rarely appear in new training materials. One explanation for this deficiency is that guidelines for writing mnemonics are not included in the Interservice Procedures (NAVEDTRA 106A), and there are apparently no other formal training packages on developing mnemonics for training.¹ It is unlikely that many curriculum designers will create mnemonics without guidelines. A set of formal procedures for creating mnemonics for use in training materials should be available to the technical

¹ The call for the use of mnemonics contained in NAVEDTRA 106A is based on recommendations made in a prepublication copy of TAEG Report 23 (Aagard and Braby, 1976).

TAEG Report No. 60

writer. This report is designed to meet this need. It provides a description and suggested applications of a series of proven mnemonics techniques.

Nine types of mnemonics are included. Each was selected because of its appropriateness for use in Navy technical training material. Some classic mnemonic techniques are not included in this report because of their limited applicability to Navy training needs. For example, the method of loci (memorizing items by "picturing" them in familiar locations) was used effectively in classical Greece. However, it is not applicable to Navy training materials because the familiar location chosen by different people will vary.

This report takes as a given evidence justifying the usefulness of mnemonics. Much has been written on mnemonics both as to content and application and is well told in a number of sources (see, for example, Higbee, 1977; Baddeley, 1976; Kausler, 1974; and Mednick, Pollio, and Loftus, 1973).

OBJECTIVE

The objective of this study is to provide a guidebook for technical writers creating mnemonics for use as learning aids in programmed instruction, technical manuals, and lesson plans to be used in conducting formal classroom instruction. This guidebook provides means for determining (1) when to use mnemonics, (2) how to choose an appropriate type of mnemonic, and (3) how to create the mnemonic. It will be particularly useful to Navy curriculum developers in carrying out the learning guidelines in NAVEDTRA 106A.

An initial use of this document is to support projects currently underway in the Training Analysis and Evaluation Group (TAEG). The first project involves creating mnemonics for lessons being authored within a computer-aided authoring system currently under development. This system uses learning algorithms calling for mnemonics (Braby, Parrish, Guitard, and Aagard, 1978). The second project, which is a part of the Navy Technical Information Presentation System (NTIPS), involves creating formats for a new generation of Navy technical manuals. The objective is to present information in procedural format so that a technician can easily recall the procedures on the job.

ORGANIZATION OF THE REPORT

Section II describes the nine mnemonic techniques considered most useful in Naval training courses. Examples of each type are included, along with prescriptions for when to use each technique. Section III presents detailed directions for the design of each type of mnemonic described in section II and practice exercises for acquiring skill in authoring each type. Appendices A, B, and C contain examples of the use of mnemonics for teaching Morse Code, Recognition of Signal Flags, and the "Orders to the Sentries," respectively.

SECTION II

MNEMONICS TECHNIQUES FOR TECHNICAL TRAINING MATERIALS

WHAT ARE MNEMONICS?

Mnemonics are rhymes, patterns, stories and other literary devices that provide a way for enhancing the organization of material in one's memory. Numerous studies have shown that material must be organized for effective learning. Material that has no apparent logical structure (e.g., the Morse Code) can be more easily learned and recalled if it is learned using some method of structure--even an artificial one. Mnemonic techniques serve to provide this artificial structure.

Mnemonic techniques help organize material and make it easy to learn to the extent that they increase meaningfulness, association, visualization, interest, and attention value (Higbee, 1977).

In one classic example of the role of meaningfulness in memorizing, subjects memorized a list of 200 nonsense syllables, a 200-word passage of prose, and 200 words of poetry (Lyon, 1914). The nonsense syllables took the longest to learn (1½ hours), followed by the prose (½ hour) with the poetry taking only 10 minutes. Poetry had the greatest degree of organization and association among these three types of verbal material. Both the prose and poetry were more meaningful than nonsense syllables.

Each of the attributes that Higbee lists as making material easier to learn and recall is illustrated in various parts of this report. Any effective mnemonic technique makes material more meaningful and therefore easier to memorize and recall. Mnemonics create a way to organize the material as an alternative to rote memorization. Graphic mnemonics make use of our ability to mentally visualize memory aids. Many mnemonic techniques are interesting and attract our attention.

WHEN TO USE MNEMONICS

How does the technical writer or podium instructor decide if any mnemonic technique is useful? Generally, if three conditions exist then a mnemonic aid should be used. If the material to be learned is (1) not logically organized, (2) complex or difficult to memorize, and (3) must be recalled accurately at a later time, then a mnemonic aid should be used. Figure 1 depicts this sequence of decisions.

A prime example of a valid decision to use mnemonic techniques concerns their use in the learning of Morse Code. Dot-dash sequences of the Morse Code letters do not follow a logical sequence. The task of learning 26 dot-dash sequences for the 26 letters of the alphabet is not simple. The student must be able to recall the code in order to carry out practice exercises to develop the speed and accuracy required on the job. Learning that W ("whiskey"

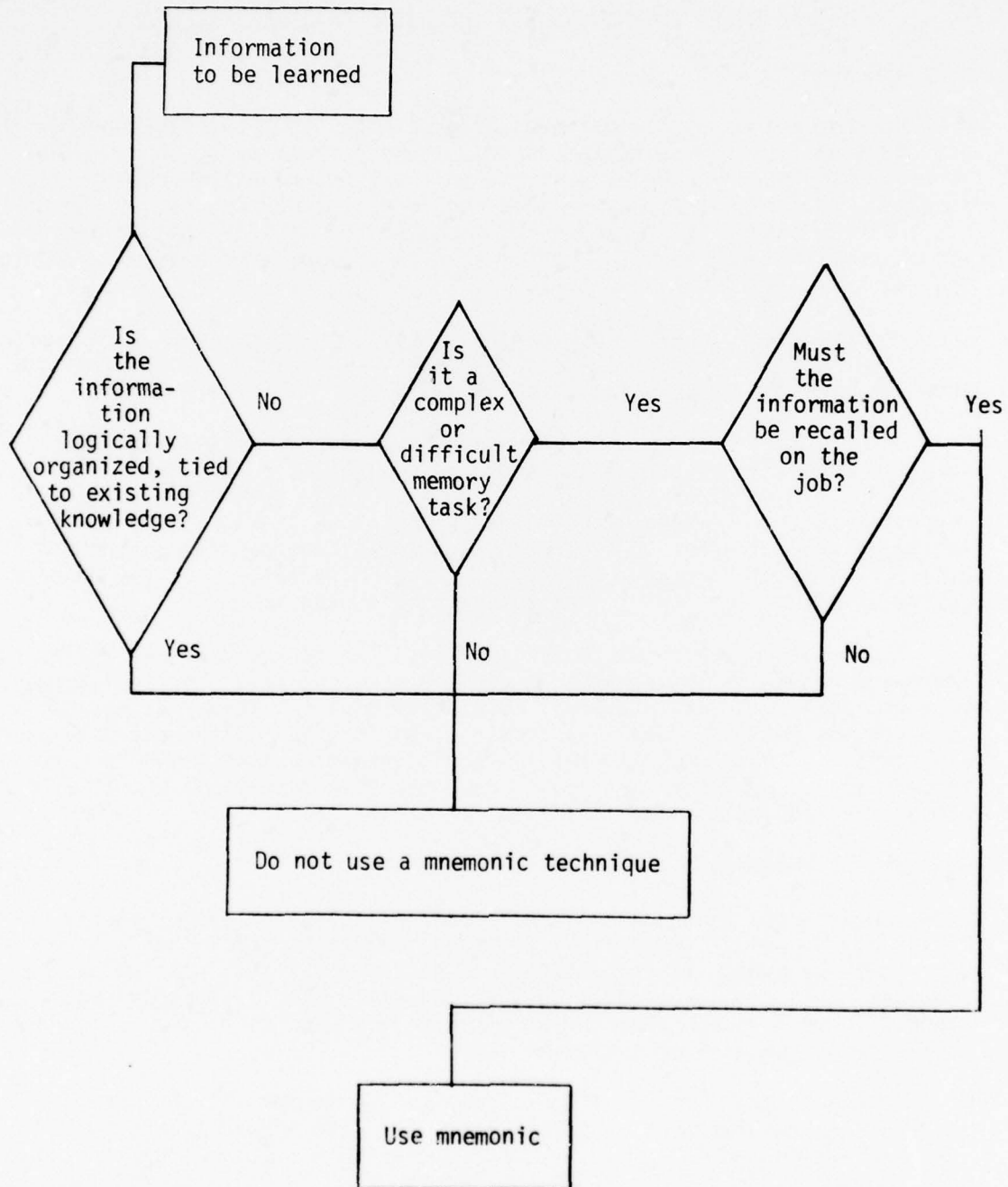


Figure 1. Decision Tree for Determining if Mnemonics Should Be Used

in the phonetic alphabet) is represented by a picture of a shot glass and whiskey bottle is a good way for a novice signalman to remember that the letter "W" is "--".



WHEN NOT TO USE MNEMONICS

Sometimes a mnemonic is not useful. For example, the sequence of steps in starting a car should be learned without using a mnemonic:

1. Fasten safety belt
2. Check automatic transmission to verify that it is in "park" or "neutral"
3. Insert key
4. Pump accelerator once and release
5. Turn starter key allowing it to turn over until it starts
6. Release key.

These steps are simple and logical. A mnemonic aid would get in the way.

- . Do not use a mnemonic to learn something simple.
- . Do not use a mnemonic to learn something logical.
- . Do not use a mnemonic in familiarization-type training to learn something that need not be recalled at some later time.

NINE MNEMONIC TECHNIQUES

The mnemonic techniques presented in this report are described briefly in table 1. This table serves as an introduction to these techniques. It contains the name and description of each of the nine types and outlines the categories of memory tasks that can be supported with each. For each mnemonic technique, the table provides at least one example of a memory task and a mnemonic to aid in its learning and recall. These techniques are discussed in greater detail in section III.

Each of the nine mnemonic techniques can support certain types of learning tasks that are important in Navy training. Acronyms and acrostics are the mnemonic techniques that will be most frequently used by technical writers. Acronyms are formed from the first letter (or letters) of several words (e.g., RADAR = RADIO DETECTION AND RANGING). Acrostics are sentences or phrases in which the first letter of each word stands for something to be

TABLE 1. TYPES OF MNEMONICS (continued)



Name of Mnemonic Technique	Description	Appropriate Memory Tasks	Example
Alliteration	Words in a series begin with the same letter or sound. The information to be recalled is included in the memory aid.	If an alliteration can be formed, it is an excellent mnemonic aid because of its uniqueness.	<div data-bbox="386 800 542 957">  <p>Letter flag for S (Sierra)</p> </div> <div data-bbox="380 323 440 491"> <p>Single <u>S</u>mall <u>S</u>quare</p> </div> <div data-bbox="574 667 716 957">  <p>Sunset Seven (Colors look like sunset at seven o'clock)</p> </div> <div data-bbox="756 653 786 957"> <p>Numeral pennant for 7</p> </div> <div data-bbox="813 701 842 957"> <p>Navigation rule:</p> </div> <div data-bbox="870 348 984 957"> <p>Keep the red buoy - - - - - Red on the right - - - - - Right when returning - - - - - Returning from sea.</p> </div>
Rhyme	The last word in a line of verse sounds like the last word of another line. The information to be recalled is included in the verse.	If a rhyme can be created, it is probably an excellent mnemonic aid because of its uniqueness.	<p>Historical date:</p> <p>Columbus discovered America in 1492.</p> <p>In fourteen hundred and ninety-two Columbus sailed the ocean blue.</p>

TABLE 1. TYPES OF MNEMONICS (continued)

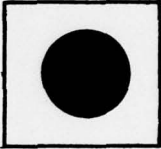


Name of Mnemonic Technique	Description	Appropriate Memory Tasks	Example																										
			Items to Remember	Mnemonic																									
Rhyme (con't)			<p>The coral snake (which is poisonous) has color stripes like the scarlet king snake (which is not poisonous). Both snakes have red, yellow, and black bands, but the coral snake has the red and yellow bands together, while the scarlet king snake has the red and black bands together. This is a useful thing to learn during survival training.</p>	<p>Red and yellow, kill a fellow. Red and black, friend of Jack.</p>																									
Pattern	Involve repetitions that can usually be visualized and then recalled.	Helpful in learning schemes.	<p>Morse Code numbers:</p> <table> <tr><td>1</td><td>.</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>2</td><td>.</td><td>.</td><td>-</td><td>-</td></tr> <tr><td>3</td><td>.</td><td>.</td><td>.</td><td>-</td></tr> <tr><td>4</td><td>.</td><td>.</td><td>.</td><td>.</td></tr> <tr><td>5</td><td>.</td><td>.</td><td>.</td><td>.</td></tr> </table>	1	.	-	-	-	2	.	.	-	-	3	.	.	.	-	4	5	<p>One dot Two dots Three dots Four dots Five dots</p>
1	.	-	-	-																									
2	.	.	-	-																									
3	.	.	.	-																									
4																									
5																									
Graphics	Items to be learned, either verbal or graphic, are tied together with a graphic (pictured in one's mind) which contains both the memory aid and the item(s) to be remembered.	Primarily useful for remembering things that are visual in nature such as flags and the Morse Code used by signalmen.	<p>..... Morse Code for H (Hotel)</p>  <p>Signal flag for I (India)</p>	<p>Hotel with four windows.</p>  <p>Indian lady with a spot on her forehead.</p> 																									

TABLE 1. TYPES OF MNEMONICS (continued)



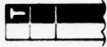

Name of Mnemonic Technique	Description	Appropriate Memory Tasks	Example	
			Items to Remember	Mnemonic
Story	A short narrative which can be as short as one sentence, containing the item(s) to be remembered.	Can be used in many kinds of memory tasks. Very short story mnemonics are best for the technical writer. Longer stories can be used by instructors.		Streaming red, white, and blue smoke, the Blue Angels fly in FORMATION.
				Red flag is a bull-fighter's cape; the crowd is yelling "Bravo" for the bull-fighter.
Association Chain	Involves a chain of associations, which can contain both verbal and visual elements, leading to the item to be learned and recalled.	Useful in many kinds of memory tasks.		The buoy is half white and half black → half the channel is to the left and half is to the right of the buoy. → Mid-channel buoy.
				Red and white flag → red running lights are on the port side of a ship → port flag.

TABLE 1. TYPES OF MNEMONICS (continued)

Name of Mnemonic Technique	Description	Appropriate Memory Tasks	Example		
			Items to Remember	Peg Word	Mnemonic
Peg Word	The peg words are words that rhyme with the digits 1 to 10. A visual image is created that includes both the peg word and the item(s) to be remembered.	Excellent technique when items have to be recalled by their number on a list.	1	One is a bun.	Cheese (yellow) in a red bun.
			2	Two is a shoe.	Gold buckle on red shoe.
			3	Three is a tree.	Redwood tree fallen in a blue lake.
			4	Four is a door.	Red barn door.

learned. These first letter techniques are useful in learning and recalling words. Of all the mnemonic aids, these are the most frequently used by students studying for tests. They are flexible and can serve as memory aids with a wide variety of words.

Alliterations (words starting with the same sound) and rhymes can only be used in special cases; both are difficult or even impossible to create in certain instances. Given words that can be memorized using an alliteration or rhyme mnemonic, then these techniques should be chosen because of their uniqueness. Once you have learned a mnemonic rhyme, such as "thirty days hath September, April, June, and November," you will rarely forget it. Rhymes, particularly, are retained longer in memory than most other kinds of verbal material.

If a visual pattern exists in the items to be learned, as in the dot-dash sequences for Morse Code numbers (.---- is 1, ..--- is 2, ...-- is 3, etc.), then the pattern should be stressed by making it into a chart. For example:

.----	1	(1 dot)
..---	2	(2 dots)
...--	3	(3 dots)
....-	4	(4 dots)
.....	5	(5 dots)

Graphic mnemonic techniques also involve the use of patterns and images and are most useful when the items to be learned and recalled are visual in nature. To the signalman using flashing lights, the Morse Code letters are visual in nature and are best learned using graphics. The visual nature of the signalman's task in decoding Morse Code (sent with light patterns) contrasts with the auditory nature of the radioman's task in receiving Morse Code (sent with sound patterns). See appendix A for the visual mnemonics used to help signalmen learn the Morse Code.

Mnemonic techniques that involve both visual and verbal memory have considerable value. These include stories, the associative chain (in which one memory triggers another), and the peg word method (in which numbers rhyme with words). The peg word method has limited application, but where it is applicable it works very well. It is the single technique described in this report that aids in learning a series of items according to their number on a list. The Navy numeral flags can be easily learned and recalled by using the peg word technique (see appendix B).

CHOOSING VERBAL OR VISUAL MNEMONICS

There are two ways of representing information in memory--verbally and visually. Most people use verbal memory (based on words) more than visual memory (based on images) but virtually everyone uses both to some extent.

One can demonstrate verbal memory capability by reciting the multiplication table; e.g., $9 \times 5 = 45$, $9 \times 6 = 54$. This is usually accomplished by recalling the appropriate numbers without using a mediating graphic image. Visual memory is developed to a high degree in many people who are mechanically inclined who can "visualize" a blueprint in three dimensions. Also, when a person is asked to recall the number of windows in his home, he will usually "see the rooms in his mind"; thus, visual memory. Mnemonic techniques that use verbal information almost exclusively are acronyms, acrostics, rhymes, and alliterations. Mnemonic techniques that depend primarily on the use of visual imagery are graphics and patterns.

Figure 2 outlines the steps in a procedure to decide the relevancy of using various mnemonics in a specific memory task. If mnemonics are considered appropriate, these steps provide guidance in choosing verbal or visual forms of mnemonics. The figure is intended as a starting point. An examination of the appendices will show that the techniques can be mixed and combined to produce effective mnemonics.

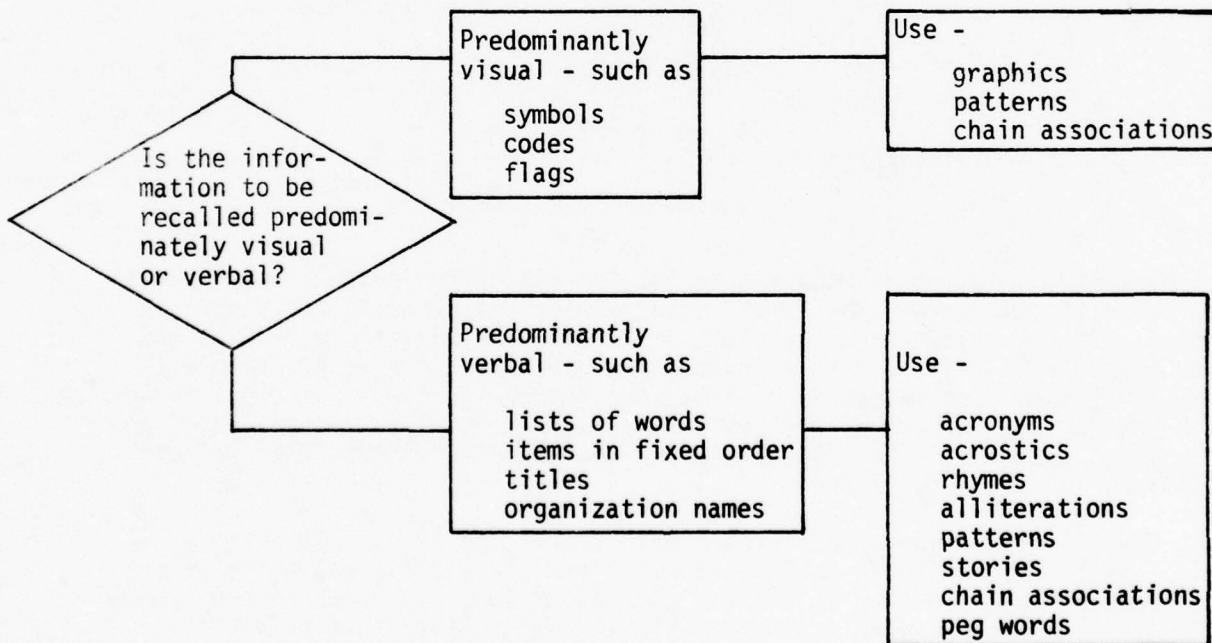


Figure 2. Decision Tree for Determining the Relevancy of Various Mnemonic Techniques

SECTION III

THE TRAINING PACKAGE

This section provides guidance for creating nine types of mnemonics. Each type is described and illustrated with examples. Directions are included for creating each type, and practice problems are provided to use in the readers' initial attempts to create their own mnemonics. In some instances the practice problems are similar for two or more mnemonics techniques. This is to demonstrate that different mnemonic techniques can be used to support the same learning task.

ACRONYMS

An acronym is an easily recalled word that helps you remember a whole list of words. Each letter in the acronym is (usually) the first letter of a word in the series of words to be memorized. You use acronyms to help remember things like titles, names of organizations or programs, items in a fixed order, or a list of items.

Example 1: A commonly used acronym helps beginning musicians recall the names of the spaces in the treble cleff. The names of the spaces are F, A, C, and E. These letters form the acronym FACE.



Example 2: The acronym NEC represents the Navy Enlisted Classification code, a system used to record information on the special skills and qualifications of Navy enlisted personnel. In this instance the acronym is used more often than the full name. However, when someone wishes to recall the full name of the code, the acronym NEC will serve as a memory aid.

Example 3: A simple acronym HOMES aids in the recall of the names of the five Great Lakes. The names of these lakes are Huron, Ontario, Michigan, Erie, and Superior.

Example 4: The acronym PPAP is a mnemonic that aids Navy Signalmen in remembering the components of the heading of a signal message. The heading contains the Procedure, Preamble, Address, and Prefix.

GUIDELINES FOR CREATING AN ACRONYM

1. Form the acronym by combining the first letter (or in some cases the first few letters) of each word in a string of words to be recalled (example: ONR = Office of Naval Research).

2. It is best to make acronyms that mean something and at the same time can be pronounced (examples: WAVES = Women Accepted for Voluntary Emergency Service; SONAR = Sound Navigation Ranging).

3. If the words to be recalled do not have to be remembered in any order, arrange the words to be remembered so they make a good acronym (one that means something and can be pronounced). (Example: The names of the Great Lakes could be arranged in any order, making possible various acronyms; i.e., MOSEH, SOEHM, HOMES, etc. The acronym HOMES should be selected because it is both meaningful and pronounceable and will be easiest to remember.)

In those instances where a useful acronym cannot be created, try developing other types of mnemonics. Acrostics, rhymes, and alliterations are often used as memory aids for the same types of learning tasks suggested here for acronyms.

PRACTICE IN CREATING ACRONYMS

Directions:

1. Create the acronym-type memory aids called for in the practice problems below.
2. After creating an acronym, check it immediately against the Guidelines for Creating an Acronym on page 15.
3. Generally there is no single correct answer. If your answer carries out the guidelines, consider it to be an acceptable acronym.

Practice Problems:

1. Signalmen must know how to use the Allied Maritime Tactical Signal Book. Create an acronym for the name of this book.
2. The Defense Mapping Agency Hydrographic Center produces charts and studies foreign charts. Create an acronym for the name of this agency.
3. The Standard Maintenance and Material Management System is designed to increase the operational readiness of fleet units through a planned system of scheduled preventive maintenance. Create two different acronyms for this system, other than the official acronym 3-M.

ACROSTICS

An acrostic is a verse or arrangement of words in which the first letter of each word represents something to be remembered. Frequently, it is a short, easily remembered sentence. Acrostics are used in remembering items in a list or steps in a procedure.

Example 1: A commonly used acrostic helps beginning musicians recall the names of the lines in the treble cleff. The names of the lines are E, G, B, D, and F. These letters are found in the acrostic Every Good Boy Does Fine.



Example 2: Navigators use the acrostic Can Dead Men Vote Twice to aid in recalling the steps in calculating the true course while navigating with a magnetic compass. (The mnemonic can also be used in calculating a magnetic heading when given the true course.)

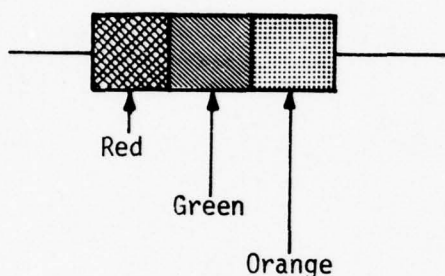
ACROSTIC	PROCEDURE	
	Key Words	Directions
<u>C</u> an	<u>C</u> ompass course	Given the <u>compass course</u> ,
<u>D</u> ead	<u>D</u> eviation correction	<u>add/subtract deviation</u> <u>correction</u>
<u>M</u> en	<u>M</u> agnetic course	to get <u>magnetic course</u> .
<u>V</u> ote	<u>V</u> ariation correction	<u>Add/subtract variation</u> to the <u>magnetic course</u>
<u>T</u> wice	<u>T</u> rue course	to obtain <u>true course</u> .

Example 3: The acrostic Rub Your Belly With Grease aids ship handlers in recalling the meaning of signal lights that mark 20 yard intervals in the distance between ships while transferring stores between ships.

<u>R</u> ub	<u>Y</u> our	<u>B</u> elly	<u>W</u> ith	<u>G</u> rease
<u>R</u> ed	<u>Y</u> ellow	<u>B</u> lue	<u>W</u> hite	<u>G</u> reen
20 yds	40 yds	60 yds	80 yds	100 yds

Example 4: A classic acrostic, learned by most electronic engineering students, describes the color code for labeling the value of resistors. Like many acrostics that have met the test of time, it uses rather earthy language.

<u>B</u> ad	<u>B</u> oys	(<u>R</u> ob)	<u>O</u> ur	<u>Y</u> oung	<u>G</u> irls	<u>B</u> ut	<u>V</u> iolet	<u>G</u> ives	<u>W</u> illingly
<u>B</u> lack	<u>B</u> rown	<u>R</u> ed	<u>O</u> range	<u>Y</u> ellow	<u>G</u> reen	<u>B</u> lue	<u>V</u> iolet	<u>G</u> ray	<u>W</u> hite
0	1	2	3	4	5	6	7	8	9



= 25×10^3 or 25,000 ohms

Note: The last color band indicates the exponent of 10

GUIDELINES FOR CREATING AN ACROSTIC

1. Identify the key word in a statement to be remembered. The key word is one that when recalled will help you recall the rest of the statement.

2. List the first letter of each key word to be remembered.

(Red Yellow Blue White Green)

(R__ Y__ B__ W__ G__)

3. Next create a verse or easily recalled statement made up of words starting with the letters:

(R__ Y__ B__ W__ G__)

(Rub Your Belly With Grease)

4. It is best to make acrostics that are vivid and when possible suggest the general subjects to be recalled.

5. Sentences are best, but any meaningful arrangement of words is acceptable.

6. If the words do not have to be recalled in any order, arrange them in an order that makes possible an easily recalled acrostic.

(For recalling the names of the Great Lakes,
Huron, Ontario, Michigan, Erie, and Superior:
Mighty Ships Have Oiled Engines or
Every Salmon Must Have Oxygen.)

PRACTICE CREATING ACROSTICS

Directions:

1. Create acrostic-type memory aids in the following practice problems.
2. After creating an acrostic, check it immediately against the Guidelines for Creating an Acrostic on page 18.
3. There is no single correct answer for each problem. If your answer carries out the guidelines, consider it to be an acceptable acrostic.

Practice Problems:

1. The planets in our solar system in the order of their distance from the sun are:

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus,
Neptune, and Pluto.
 - a. Create an acrostic for recalling the names of the planets in this order.
 - b. Create another acrostic for recalling the names of the planets in another order.
2. Planning plays a major role in any Naval campaign. The plan for an operation is communicated to Naval units as an Operation Order (OpOrder). The five numbered paragraphs in an OpOrder are headed (1) Situation, (2) Mission, (3) Execution, (4) Administration and Logistics, and (5) Command and Signal. Create an acrostic for recalling these paragraph headings and their numbers.
3. A vessel in distress requiring assistance from other vessels or from shore, displays distress signals to request assistance. These signals are:
 - a. A gun or other explosive signal fired at intervals of about a minute.
 - b. A continuous sounding with any fog-signaling apparatus.

TAEG Report No. 60

- c. Rockets or shells, throwing red stars fired one at a time at short intervals.
- d. A signal made by radiotelegraphy or by any other signaling method consisting of the group ... --- ... (SOS in the Morse Code).
- e. A signal sent by radiotelegraphy consisting of the spoken word "MAYDAY."
- f. The International Code Signal for distress is flying the Code, November, and Charlie flags.
- g. A signal consisting of a square flag having above or below it a ball or anything resembling a ball.
- h. Flames on the vessel (as from a burning tar barrel, oil barrel, etc.).
- i. A rocket parachute flare or a hand flare showing a red light.
- j. A smoke signal giving off a volume of orange-colored smoke.
- k. Slowly and repeatedly raising and lowering arms outstretched to each side.

Create an acrostic for use in recalling all the types of distress signals. The signals can be recalled in any order.

RHYMES

A rhyme can be used as a memory aid because the rhyme itself is easy to remember and significant information embedded in the rhyme can also be easily recalled. Rhymes are not easily made, and not all technical writers will find it easy to create rhyme mnemonics. However, if a rhyme is appropriate and can be created, it will be a very effective aid to memory. It is most useful in learning and recalling verbal material.

Example 1: This rhyme is used to remember an historical date:

In fourteen hundred and ninety-two
Columbus sailed the ocean blue.

Example 2: This is a spelling aid to remember the order of i and e:

I before e except after c.

Example 3: A rhyme can be used to remember how to spell "principle"--a natural law--and "principal"--the officer of a school.

A principal is a pal.

Example 4: A rhyme is useful in remembering the color markings of the poisonous coral snake to distinguish it from the nonpoisonous scarlet king snake which looks very much the same. This is a good thing to learn during survival training. Both kinds of snakes have red, yellow, and black bands but the coral snake has red and yellow bands next to each other while the nonpoisonous snake has the red and black bands next to each other. The rhyme for remembering this is:

Red and yellow
kill a fellow,
Red and black,
friend of Jack.

GUIDELINES FOR CREATING A RHYME MNEMONIC

1. Create a short verse in which the last word in each line or phrase sounds like the last word in another line or phrase.
2. The rhyme mnemonics should be short and to the point like all four examples above.
3. Try to create a rhyme that is vivid, easily recalled, and acceptable to students and instructors. (This is often a difficult or impossible task.)
4. If an appropriate rhyme cannot be created, use another form of mnemonic. (If a rhyme mnemonic can be created, it will probably be an excellent aid to memory.)

PRACTICE CREATING RHYME MNEMONICS

Directions:

1. Create the rhyme mnemonics called for in the practice problems below.
2. After creating a rhyme mnemonic, check it immediately against the Guidelines for Creating a Rhyme Mnemonic above.
3. Generally, there is no single correct answer. If your answer carries out the guidelines, consider it to be acceptable.

Practice Problems:

1. The colors of the flares fired from a Very Pistol during the attempted rescue of a man overboard have specific meanings as follows:

1 White . . . Have recovered man
1 Red . . . Need assistance
1 Green . . . Cannot find man.

Create a rhyme for remembering what each color flare means.

2. As we move toward the adoption of the metric system, we need to think in terms of millimeters instead of mentally converting millimeters to inches to understand the size of something.

Create a rhyme to help recall the following common dimensions expressed directly in millimeters:

10 mm = width of fingernail on little finger
50 mm = width of three fingers of the hand, excluding little finger
100 mm = width of entire hand (including thumb) at broadest point
500 mm = from elbow to fingertip.

3. Weather reports include temperatures in Celcius as well as Farenheit. It is convenient to think directly in terms of degrees Celcius rather than converting to degrees Farenheit.

Create a rhyme to help recall the following Celcius temperatures that occur as a part of our daily living:

100° C = water boiling
40° C = a hot day in the desert
25° C = a comfortable temperature in your house
0° C = water freezing
-20° C = a bitter cold day in winter.

ALLITERATIONS

An alliteration is a series of words that start with the same letter or sound. It is another case of a first letter mnemonic, like acronyms or acrostics, but is probably not used as often because alliterations are frequently difficult or impossible to devise. Nevertheless, it is the best memory aid for remembering certain items (given that the alliteration can be made) because it is so distinctive and because it conveys considerable information with just a few words.

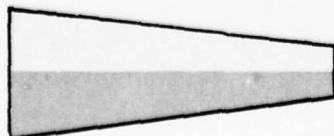
Example 1: Red buoys mark the right-hand side and black buoys mark the left-hand side of a channel when a ship returns from sea. An alliteration can be used to remember the key points.

Red Right Returning

The red buoy should be on right (starboard) side when a ship is returning from sea.

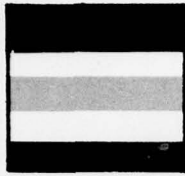
Example 2: A number of flags and pennants can be remembered using alliterations as memory aids.

Seven Pennant



Sunset Seven

The colors look like sunset--
at seven o'clock.



C (Charlie) Flag



Charlie Campaigns in Chicago
Red, white, and blue bunting is
used in decorating the speaker's
platform.

GUIDELINES FOR CREATING ALLITERATION MNEMONICS

1. Create a short alliteration containing the information to be recalled. Each key word in the rhyme should start with the same letter.
2. Use words that tell a story. An alliteration that tells a story is a stronger memory aid than one that does not. Example 1 tells a story (red buoys mark the right side when returning from sea). Once learned, it will be easily recalled.
3. Remember that the other first letter mnemonics, acronyms and acrostics, can be used more frequently than alliterations. If you cannot form an alliteration, try one of the other techniques.
4. If an alliteration can be formed, it is probably the best mnemonic to use because it will be distinctive and therefore easy to recall.

PRACTICE CREATING ALLITERATION MNEMONICS

Directions:

1. Create alliteration memory aids in the following practice problems.
2. After creating the alliteration memory aid, check it immediately against the Guidelines for Creating Alliteration Mnemonics above.
3. There is no single correct answer for each problem. If your answer carries out the basic guidelines, consider it to be acceptable.

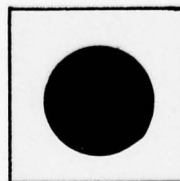
Practice Problems:

1. Create an alliteration mnemonic for remembering the letter flags for K (kilo) and I (India). Refer to example 2 to guide you.

K (Kilo) =



I (India) =



2. Make up an alliteration mnemonic to remember that "mega" is the prefix standing for 1,000,000.

3. Make up an alliteration mnemonic to remember that Hertz (Hz) is the symbol for "cycles per second."

PATTERNS

Patterns are easy to remember because they are repetitive. Once you learn the "key" to the pattern, you can figure out what it represents. The best mnemonic patterns can be visualized. In addition, the rules for the pattern can be stated. Frequently, pattern mnemonics can be put into a chart with brief word labels describing the categories in the patterns.



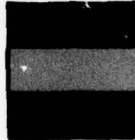


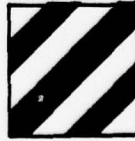
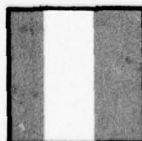


Example 1: The international distress signal expressed in Morse Code has an easily learned pattern. "SOS" consists of three dots, three dashes, and three dots.

S O S
... --- ...




Example 2: A Navy signalman must learn the flags representing numerals. The numerals 1 to 9 form a pattern based on two categories:

- . the directions of the stripes
- . the predominant colors in the flag.

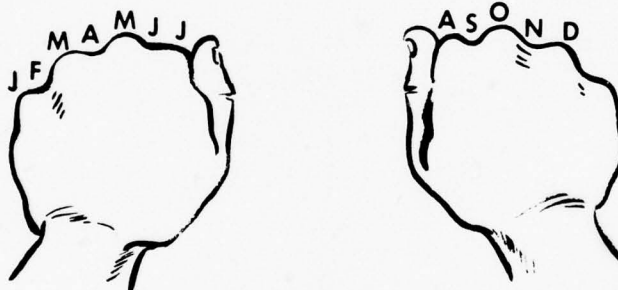
This pattern can be seen when the flags are presented in a chart.

		Predominant Color		
		Red	Yellow	Blue
Direction of Stripes	Horizontal	1 	2 	3 
	Diagonal	4 	5 	6 
	Vertical	7 	8 	9 

This pattern is easily recalled when reduced to its simplest form.

Direction of Stripes	Predominant Color		
	Red	Yellow	Blue
	1	2	3
	4	5	6
	7	8	9

Example 3: One way of knowing which months have 31 days and which have less than 31 days is to associate months with your knuckles and the valleys between knuckles.



The "knuckle" months have 31 days. The "valley" months have less than 31 days. (While not the most commonly used mnemonic for this task, it works well with visually oriented people.)

GUIDELINES FOR CREATING PATTERN AIDS TO MEMORY

1. Where there is repetition in something that needs to be memorized, then a pattern mnemonic may be useful. For example, if a seven digit number has repetition in it (7434386), recognizing the repetition (two 43's) makes it easier to learn.

2. The best use of the pattern mnemonic is when the pattern can be visualized. The Morse Code for SOS (... --- ...) given in the example is easy to visualize.

3. If possible, put the items to be memorized into chart form. The flags for the numbers 1 through 9 are shown in chart form in the example. This makes them easy to learn.

4. State the rules of the pattern whether these rules apply to a chart or simply a repeated pattern.

PRACTICE CREATING PATTERN MNEMONICS

Directions:

1. Create the pattern-type memory aids called for in the practice problems below.
2. After creating the pattern-type memory aid, check it immediately against the Guidelines for Creating Pattern Aids to Memory on page 25.
3. Generally there is no single correct answer. If your answer carries out the guidelines, consider it to be acceptable.

Practice Problems:

1. Make a chart and describe in words the pattern for the digits 0 through 9 in Morse Code. If you do not know Morse Code, here are the digits:

1 is .---- 2 is ..--- 3 is ...-- 4 is- 5 is
6 is -.... 7 is --... 8 is ----.. 9 is ----. 0 is ----

2. Aerographer's Mates need to learn weather map codes for a great many kinds of weather conditions. Describe in words the pattern of symbols representing sky coverage. Put into a chart the following symbols:



Sky obscured;



No clouds;



Less than one-tenth
or one-tenth;



Two and three-tenths;



Four-tenths;



Five-tenths;



Sixth-tenths;



Seven and eight-tenths;



Nine-tenths or over-
cast with openings;



Completely overcast.

3. Describe a pattern for helping you learn the motor serial number:

248489494

NOTE: While this cannot be put into chart form, there are repetitions and patterns in this number.

GRAPHICS

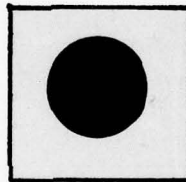
A graphic mnemonic is an easily recalled image which is associated with, and aids in the recall of, an image that is difficult to recognize and name. Words may be included in the graphic mnemonic. These mnemonics are commonly used in learning to code and decode graphic symbols and in classifying visual objects.

Example 1: A set of graphic mnemonics is being used in the Navy Signalmen School to teach Morse Code. The images are associated with the words in the phonetic alphabet (P = Papa, J = Juliette, etc.).



The graphic mnemonic "Papa's ears and eyebrows" is easily recalled. It is associated with the Morse Code sight pattern .--. representing the phonetic letter Papa or "P." See appendix A for a complete set of graphic mnemonics for the Morse Code.


Example 2: The signal flag



represents India or I.



In a simple graphic mnemonic the dot in the flag is presented as the dot on the forehead of a lady from India.

Example 3: Aerographer's Mates learn 100 symbols representing present weather or obstruction to vision. The symbol  represents "thunderstorm during past hour, but not at time of observation." The weather symbol serves as a mnemonic, and the mnemonic effect can be enhanced by making clear the symbolism within the weather symbol, as in the following example:



Example 4: For centuries graphic mnemonics have been used to aid in recognizing constellations of stars and recalling their names. A group of stars with the appearance of



is known as the big dipper. This group of stars is easily recognized and its name recalled. By drawing mental lines between the stars, a dipper-like image is created.



GUIDELINES FOR CREATING GRAPHIC MNEMONICS

1. List the symbols, or other images that are difficult to recognize and name.

(VICTOR)

(UNIFORM)

(JULIETT)

(FOX TROT)

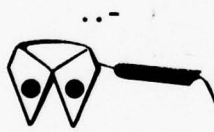
...-

..-

....

...-

2. Create a graphic mnemonic (drawing) which is easily associated with the name and image to be recalled. The drawing should contain elements of the image to be recalled. It is often useful to mix drawings and words.



VICTOR in boxing

UNIFORM insignia

JULIETT

FOX TROTing

3. Make sure the graphic mnemonic is vivid enough and designed to support the required type(s) of recall; i.e., coding and/or decoding. (Coding is the process used in sending Morse Code; decoding is the process used in receiving Morse Code.)

PRACTICE CREATING GRAPHIC MNEMONICS

Directions:

1. Create graphic mnemonics in the practice problems listed below.
2. After creating a graphic mnemonic, check it immediately against the Guidelines for Creating Graphic Mnemonics above.
3. There is no single correct answer for each problem. If your answer carries out the guidelines, consider it to be an acceptable graphic mnemonic.

Practice Problems:




1. The Morse Code is used by signalmen in exchanging messages between ships by flashing light.

TAEK Report No. 60

a. Create graphic mnemonics for the following Morse Code sight patterns. Your answers should be different from those shown in appendix A.

<u>B</u> ravo	-...
<u>X</u> ray	...-
<u>Y</u> ankee	-.--
<u>G</u> olf	--.
<u>W</u> hiskey	.--
<u>K</u> ilo	-.-

2. Many of the 100 symbols representing present weather are made up of

two or more small symbols. For instance,  indicates a thunderstorm with slight or moderate hail, where  represents the thunderstorm and  indicates hail. Seven common elements found in present weather symbols are:

drizzle	rain	snow	showers	hail	fog	thunderstorm.
•	•	*	▽	△	≡	

Create graphic mnemonics for recalling the meaning of each of these symbols. (Note: The symbols already suggest their meaning. Your job is to make this meaning obvious.) Perhaps you do not need mnemonic aids to remember these particular symbols? If they are logical enough so that they already suggest what they represent, then they do not require an additional memory aid.

STORIES

Creating a story mnemonic containing a series of items to be recalled is a good way to memorize the items. The story as a mnemonic technique has fewer constraints on it than other aids to memory such as acronyms or pattern mnemonics. A story can be loosely constructed, limited only by one's imagination.

A simple one or two sentence story (like example 1) is a good technique for the technical writer as well as the instructor to use. More involved stories are best suited for use by an instructor in the classroom.

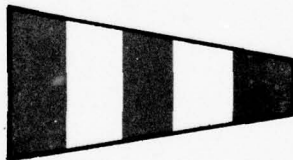
Example 1: The flag representing the letter B (for BRAVO) is red.



The story for remembering it is:

"The red flag is a bullfighter's cape.
The crowd is yelling 'BRAVO' for the bullfighter."

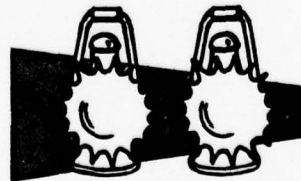
Example 2: This pennant means CODE or ANSWER.



The story mnemonic, concerning the ride of Paul Revere, can be used in recalling the name of this pennant. The white panels of the pennant represent lights in the North Church tower.

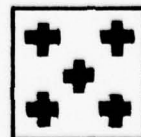
Paul Revere got his ANSWER in CODE.
1 by land, 2 by sea.

The Red Coats are coming.



Example 3: This is a story to remember the colors of five of the numeral flags. (It will be most effective if the students are bowlers.)

Flags for 4 and 7 are red and white.
Flags for 6, 9, and 0 are blue and white.



"George White who is 47 goes bowling every Friday night wearing his lucky red bowling shirt.

Last Friday he bowled a 690 series and his wife kept score with a blue pen."

Example 4: This is the weather symbol for a moderate or light dust storm:



The story used to remember this is "An indian shot Sam in a light dust storm."

GUIDELINES FOR CREATING STORY MNEMONICS

1. If the story is to be used in a training manual, it should be short and to the point.
2. Stories used by instructors in the classroom need not be as short, and a humorous story is a better mnemonic than a more serious one.
3. When possible, each sentence should contain the mnemonic and the item(s) to be remembered -- as a unit. Example 3 above illustrates this point.
4. A story can incorporate other mnemonics, in fact, any of the memory aids described in this report.

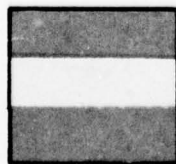
PRACTICE CREATING STORY MNEMONICS

Directions:

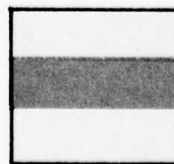
1. Create the story mnemonics called for in the practice problems below.
2. After creating the story mnemonic, check it immediately against the Guidelines for Creating Story Mnemonics above.
3. Generally, there is no single correct answer. If the answer carries out the guidelines, consider it to be acceptable.

Practice Problems:

1. Flags for the numerals 1 and 2 are both red and yellow. Make up a story mnemonic to remember which is which.



1



2

TAEG Report No. 60

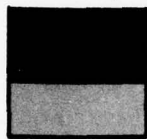
2. Make up a story to remember the main point of each of the first five sentry orders. The key point in each is underlined.

1. Take charge of post
2. Walk post in military manner
3. Report violation of orders
4. Repeat calls from post more distant than your own
5. Quit post when properly relieved.

3. Make up a separate story to remember the flags for A (Alfa), E (Echo), I (India), O (Oscar), and U (Uniform).



A



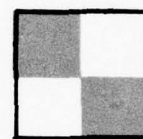
E



I



O



U

ASSOCIATION CHAINS

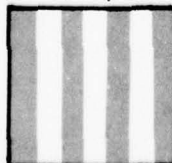
An association chain is a general form of memory aid in which some characteristic of a symbol reminds you of a second image or verbal idea, which reminds you of the meaning of the original symbol. In a sense, all mnemonics work this way. This category differs, however, in that the association is a loose one, and examples cannot be clearly called an acronym, alliteration, or any one of the other precisely defined forms. Also, a chain of any practical number of mental images or verbal ideas can serve as a mediator between the original symbol and its meaning.

Example 1: A mid-channel buoy marks the middle of a channel in an inland waterway. It is painted (vertically) half black and half white.



When you see the buoy, you note that the black and white paint splits the buoy into a right and left side. This design reminds you that half the channel is to the right and half to the left and that its name is "mid-channel buoy."

Example 2. The signal flag meaning "port" consists of alternating red and white vertical stripes. When it is hoisted with other maneuvering signals, it indicates the movement will be to the port.



Seeing the red stripes reminds you that red running lights are on the port (left) side of a ship, which reminds you that a red striped flag means port.

Example 3: Aerographer's Mates refer to the Plain Language Terminal Forecast (PLATF) code in preparing one type of weather report message. This code is as follows:

G₁ G₁ G₂ G₂ h_s h_s NVVww dfff (Plain Language) QNH

The Aerographer's Mate refers to this code to determine the order of information in the weather message. One element of this code is "dfff" where "dd" represents the direction of surface winds in tens of degrees, and "ff" represents the velocity of wind in whole knots.

The first "d" in "dd" reminds you of the "d" in direction which reminds you of the verbal string "direction of surface wind." The second "d" reminds you of "degree" which reminds you of "tens of degrees."

The "ff" reminds you of "force of wind," which reminds you that the force of wind is related to the velocity of the wind, which reminds you that "ff" means "the velocity of wind in whole knots."

Example 4: Considerable practice is required for an English speaking person to learn to recognize and recall Russian words. The word "IZBA" means "hut" and "KARANDASH" means "pencil." Logical associations between these English and Russian words do not exist. However, mnemonic associations can be created and have proven useful aids in recalling the meanings of these Russian words. (This example is taken from Atkinson and Raugh, 1974.)

"IZBA" sounds like "he's bad" which reminds you of a man exiled to Siberia to live in a small hut.

The ASSOCIATION CHAIN is:

"IZBA" ---> he's bad --->  ---> Hut

"KARANDASH" sounds like "car, ran, dash" which starts a chain of associations including a speeding car which leads to a speeding ticket which leads to a pencil used in writing the ticket.

The ASSOCIATION CHAIN is:

"KARANDASH" ---> car, ran, dash ---> speed ---> speeding ticket ---> writing speeding ticket ---> pencil

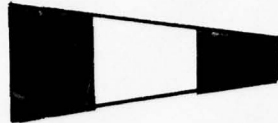
GUIDELINES FOR CREATING ASSOCIATION CHAINS

Directions:

1. Make a list of the mental associations (images or verbal ideas) that

come to mind when you think about the information to be recalled.

(Example: This is the "starboard" pennant.



This pennant has green stripes. Green reminds you of "Ireland," "Kelly Green," and "green running lights.")

2. Determine if any of the mental associations in step 1 remind you of the meaning of the symbol, or a chain of associations lead you to the meaning.

(Example: Green stripes on the pennant remind you of green running lights. Green running lights are on the starboard (right) side of a ship. A green and white pennant means "starboard.")

3. Make sure that the association makes it possible to differentiate similar symbols, so as to not confuse the symbol to be recalled with other symbols that look very much like it.

(Example: Two Navy pennants contain green areas:

The starboard pennant



and the preparative pennant.)



If the mnemonics for each stress only green, one pennant could be mistaken for the other. While the mnemonic for STARBOARD stresses green, the mnemonic for PREPARATIVE stresses yellow and green.

4. Prepare the mnemonic using graphics and/or verbal information, making clear the chain of associations that leads from the symbol to the meaning. (In many instances, the reverse process, from the meaning to the symbol, should also be an easily accomplished sequence of associations.)

Example: green stripe ---> green running lights ---> green running lights are the starboard lights ---> starboard pennant.

PRACTICE CREATING ASSOCIATION CHAINS

Directions:

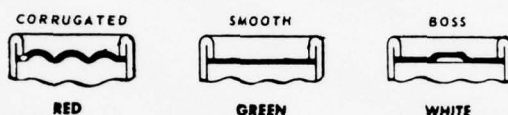
1. Create the association chain type mnemonics called for in the practice problems on the next page.

2. After creating an association chain, check it immediately against the Guidelines for Creating Association Chains on pages 33 and 34.

3. Generally there is no single correct answer. If your answer carries out the guidelines, consider it to be an acceptable association chain.

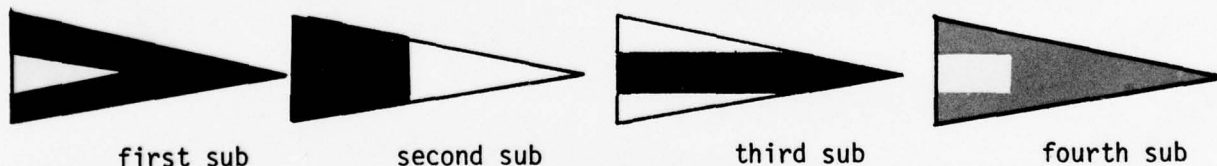
Practice Problems:

1. Red, green, and white flares are shot from Very Pistols as signals to call for help and for a number of other specific purposes. The flare cartridges are labeled with a touch sensitive marking so that at night, when all other markings are not visible, the signalman can always tell the color of the flare cartridge by feeling the texture of the closing wad before he puts it into the pistol.



Create an association chain to aid in recalling the color of the flare cartridge by feeling the texture of the closing wad.

2. Four pennants are used as substitutes for other flags or pennants in a flag hoist message. For instance, the use of substitutes may be necessary when the various messages on the flag hoist require two or more of the same flag or pennant.



Create an association chain for each pennant to aid in recognizing and recalling the name of each pennant.

3. The elements in the PLATF code for sending weather messages are:

$G_1 G_1$ = start of forecast period in whole hours Greenwich Mean Time (GMT)

$G_2 G_2$ = end of forecast period in whole hours GMT

$h_s h_s$ = height of base of each cloud layer above ground in hundreds of feet

VV = visibility in statute miles

ww = weather and obstruction to vision

Create a simple association chain to aid in recalling the meaning of each of these elements in the PLATF code.

PEG WORD METHOD

The peg word method consists of a list of items that rhyme with the numbers 1 to 10. The student can easily learn a list of steps or objects by picturing in his mind the item to be learned together with the peg word.

The peg word method is a powerful technique in helping to learn items associated with numbers. It takes about 10 minutes to learn. Some of the images used can be bizarre. It is a good technique for use in the classroom. While it has limited application for printed training material, in certain instances it is an excellent technique. Aside from the examples in this section, appendix B contains an illustration of the peg word method for learning the numeral signal flags. Appendix C is the full set of 11 sentry orders to be learned using the peg word method.

One frequently used set of peg words is as follows:

One - Bun	Six - Sticks
Two - Shoe	Seven - Heaven
Three - Tree	Eight - Gate
Four - Door	Nine - Line
Five - Hive	Ten - Hen

Using the peg words to memorize a list of items involves forming a mental image of the peg word together with the item to be remembered. For example, if the first item to be remembered is a deck of cards, picture a bun (one is a bun) with the deck inside--a card sandwich. Never mind that this is an unusual image. Studies have shown that absurd images are just as easy to remember as sensible ones.

Example 1: Now that we are using the metric system, we need to learn the prefixes for metric system units. Some of them are:

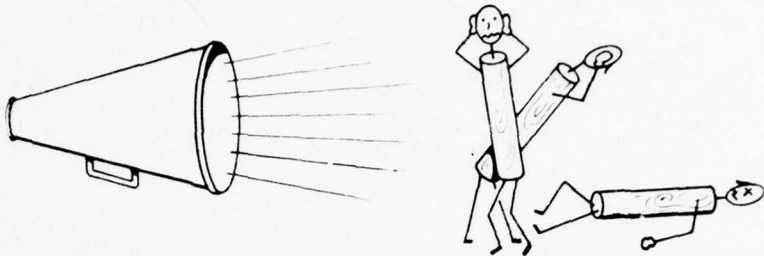
GIGA = 1,000,000,000 or 10^9
(Remember 9 zeros)

Nine - Line



A "g" and a "ga" pulling on a line which is really a stretched out "i." (GIGA)

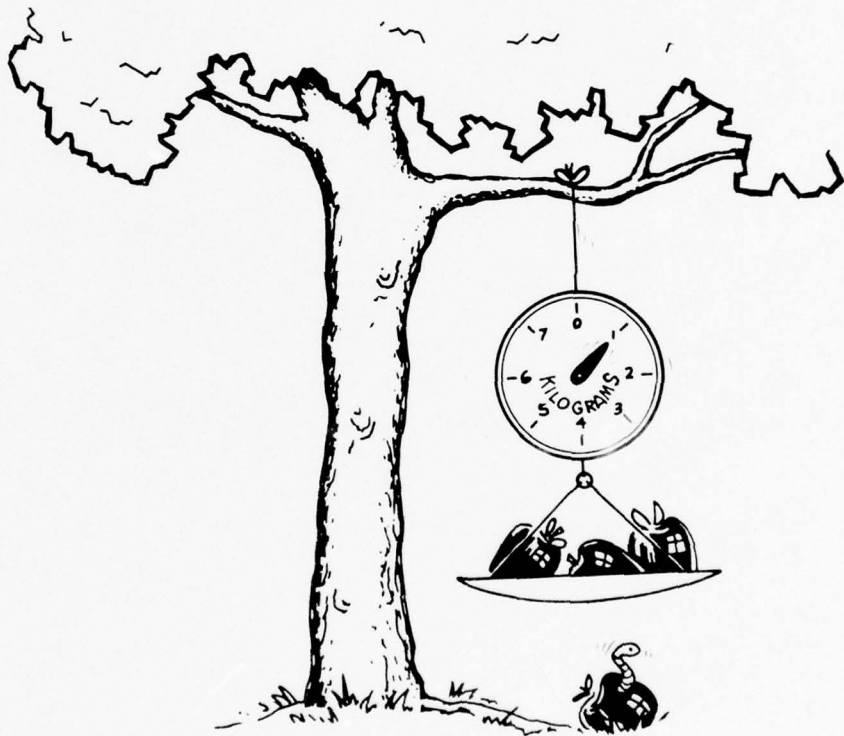
MEGA = 1,000,000 or 10^6
(Remember 6 zeros)



Six - Sticks

Megaphone yelling at sticks. (MEGA)

KILO = 1,000 or 10^3
(Remember 3 zeros)



Three - Tree

Apple tree with scale on it containing
one kilogram of apples. (KILO)

Example 2: Orders to the Sentries (or "General Orders" as they used to be known) must be learned by Navy recruits to the point that they can be recited by number. The peg word system is particularly useful for learning and recalling items by number. Appendix C contains the full package of the 11 sentry orders and the peg word mnemonics to learn them.

Order

Peg Word

Image

1. Take charge of this post and all government property in view.

Bun



Sentry on a giant bun overlooking post, "taking charge" of post.

2. Walk my post in a military manner, keeping always on the alert, and observing everything that takes place within sight or hearing.

Shoe



Walking post wearing well shined shoes in military manner.

GUIDELINES FOR CREATING PEG WORD MNEMONICS

1. First you must lay out the peg words so the student can learn them. The traditional set of peg words is:

One is a bun
Two is a shoe
Three is a tree
Four is a door
Five is a hive
Six is sticks
Seven is heaven
Eight is a gate
Nine is a line
Ten is a hen.

Students should be instructed to visualize (form a mental image) of each of the peg words, one at a time.

2. Students should then be instructed to form an image of each item to be learned together with the peg word. In the case of printed training material, art work is useful in helping the student to form the mental image but it is not essential. If an instructor is using the peg word technique before a class, he can describe the image.

3. The major advantage of the peg word technique is that it allows recall of a list of up to 10 items by number in any order. For example, the general orders need to be recalled by number and these can be taught using the peg word technique (see appendix C). Peg words can be used to memorize either lists or sequences.

4. The peg word selected need only rhyme with the particular number; in other words, substitutions are permitted. For example, "ten is men" can be substituted for "ten is a hen" as is shown in the Orders to the Sentries example in appendix C.

PRACTICE USING PEG WORDS

Directions:

1. Use the peg word list above for remembering the items in the problems below.

2. Once you have worked through a problem, check your method with the Guidelines for Creating Peg Word Mnemonics above.

3. There is no single correct answer. The images used in associating the peg words with the items to be remembered are different with different people. If your associations are easy to visualize and follow the other guidelines, your technique is acceptable.

TAEG Report No. 60

Practice Problems:

1. In a chemistry laboratory when mixing pure sulfuric acid with water, it is important to pour the acid into the water rather than vice versa. If water is poured into pure acid, the water will get very hot, turn to steam and splatter hot acid. Use the peg word method to learn the proper method of diluting sulfuric acid. The peg words should help you to remember that acid is handled first and water is second.

2. Learn that 2.54 centimeters equals 1 inch using the peg word method.

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Mednick, S. A., Pollio, H. R., and Loftus, E. F. Learning. (2nd Ed.) Englewood Cliffs, N.J.: Prentice-Hall. 1973.

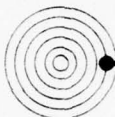


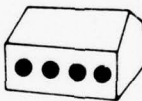

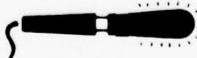
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APPENDIX A



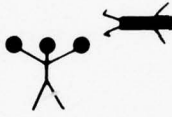

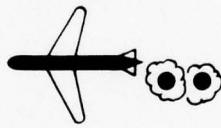
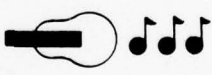

MORSE CODE MNEMONICS
(FOR USE WITH FLASHING LIGHTS)

TAEG Report No. 60



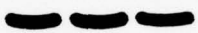
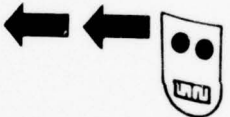


SYMBOL SET #1:

Definition	Memory Aid	Symbol	
E	<u>ECHO</u> on sonar		.
I	2 <u>INDIA</u> ink spots		..
S	3 <u>SIERRA</u> mountains		...
H	4 <u>HOTEL</u> windows	
T	<u>TANGO</u> dancers		-
M	<u>MIKE</u>		--

SYMBOL SET #2:

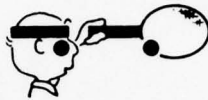


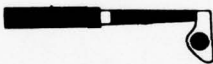

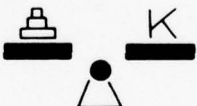
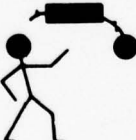
Definition	Memory Aid	Symbol
A	<u>ALFA</u> - alphabet soup 	-
U	<u>UNIFORM</u> insignia 	..-
V	<u>VICTOR</u> in boxing 	...-
N	<u>NOVEMBER</u> turkey 	-.
D	<u>DELTA</u> jet and 2 clouds 	-..
B	<u>BRAVO!</u> Play 3 notes again! 	-...
J	<u>JULIETT</u> 	.-.-

SYMBOL SET #3:

Definition	Memory Aid	Symbol
P	<u>PAPA</u> 's ears and eyebrows 
X	<u>XRAY</u> of broken bone 	---
O	3 <u>OSCAR</u> Meyer weiners 	---
Z	<u>ZULU</u> warrior throwing spears 
Q	<u>QUEBEC</u> city 	---
Y	<u>YANKEE</u> Doodle 	---

TAEG Report No. 60

SYMBOL SET #4:


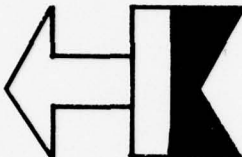
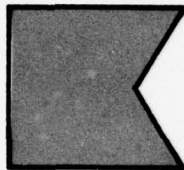
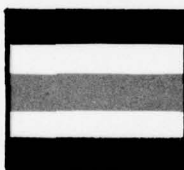

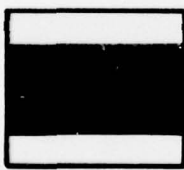
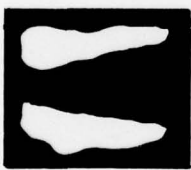
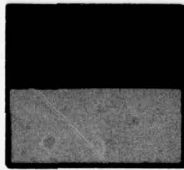
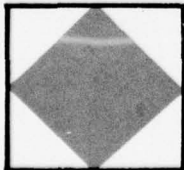


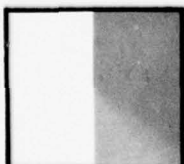
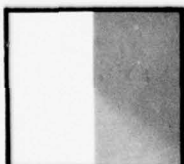
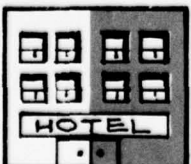
Definition	Memory Aid	Symbol	
C	<u>CHARLIE</u> Brown		-. -.
F	<u>FOX</u> <u>TROT</u> ting		.. -.
L	<u>LIMA</u> beans		.. -.
G	<u>GOLF</u> club		- - ,
W	<u>WHISKEY</u>		.. -
K	<u>KILO</u> gram		- . -
R	<u>ROMEO</u> throwing rose		.. -

TAEK Report No. 60

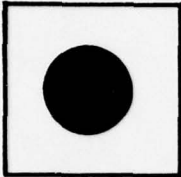

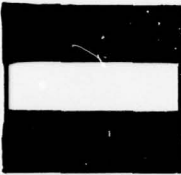
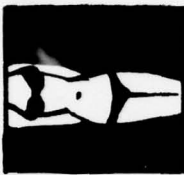


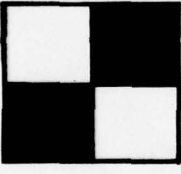



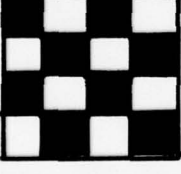




APPENDIX B

NAVY SIGNAL FLAG MNEMONICS

LETTER FLAGS

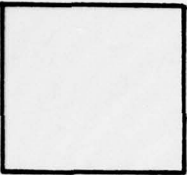
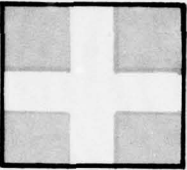


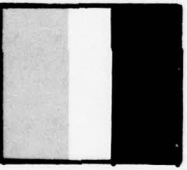

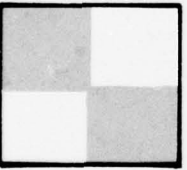



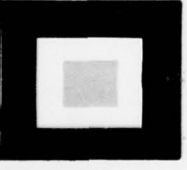

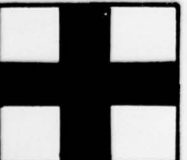
FLAG	MEMORY AID	MEANING		
		WRITTEN	SPOKEN	
		Blue and White Feather on <u>A</u> rrow	A	ALFA
		Red flag is a <u>B</u> ullfighters cape. Crowd is yelling BRAVO for him.	B	BRAVO
		CHARLIE <u>C</u> ampaigns in <u>C</u> hicago.	C	CHARLIE
		Red, White and Blue bunting is used in decorating the speakers platform.	D	DELTA
		River DELTA (Sandbars and Islands in mouth of river)	E	DELTA
		Blue sky - Red <u>E</u> arth	E	ECHO
		Fox	F	FOXROT
		Yellow fairways Blue water hazards - a GOLF course -	G	GOLF
		Red light district HOTEL	H	HOTEL

LETTER FLAGS

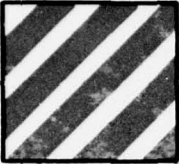

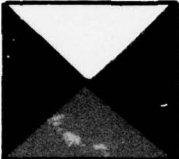
FLAG	MEMORY AID		MEANING	
			WRITTEN	SPOKEN
		Dancer from INDIA	I	INDIA
		JULIETT in swimming pool	J	JULIETT
		Kilogram of Gold	K	KILO
		LIMA Llama	L	LIMA
		Matchetes	M	MIKE
		Flag looks somewhat like a calendar. Month - NOVEMBER	N	NOVEMBER
		OSCAR Sends Semaphore Messages.	O	OSCAR
		PAPA's shiny bald head	P	PAPA

LETTER FLAGS

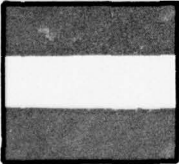
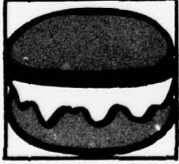
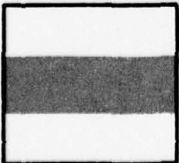

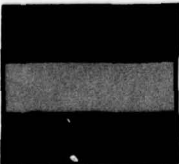



MEANING

FLAG	MEMORY AID		WRITTEN	SPOKEN
		Yellow Fever - Quarantine	Q	QUEBEC
		ROMEO with rose	R	ROMEO
		Single Small Square	S	SIERRA
		Last TANGO in Paris	T	TANGO
		Red and white UNIFORM	U	UNIFORM
		"V" for Victory - bought with red blood	V	VICTOR
		Red Eye WHISKEY	W	WHISKEY
		Blue Cross/Blue Shield Insurance pays for Xrays	X	Xray

LETTER FLAGS

FLAG	MEMORY AID	MEANING	
		WRITTEN	SPOKEN
		Y	YANKEE
		Z	ZULU

NUMBER FLAGS

FLAG	MEMORY AID	MEANING	
		WRITTEN	SPOKEN
		1	ONE
		2	TWO
		3	THREE
		4	FOUR

NUMBER FLAGS

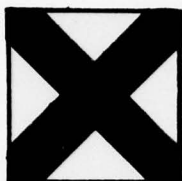
MEANING

FLAG

MEMORY AID

WRITTEN

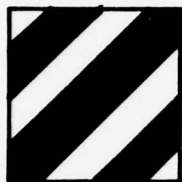
SPOKEN



5 is a Hive
Blue sky with
yellow bees and
beehive

5

FIVE

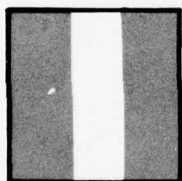


6 is Sticks

Bundle of sticks

6

SIX



7 is Heaven

Light from heaven
(white)
to hell (red)

7

SEVEN



8 is Navigate

Yellow sand -
Blue Suez Canal
- Navigate the canal -

8

EIGHT

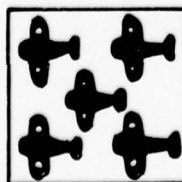
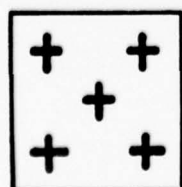


9 is Wine

Two bottles of wine

9

NINE



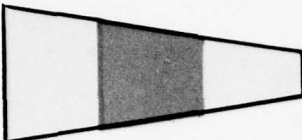
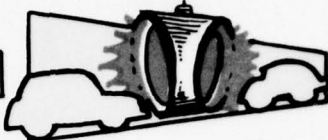
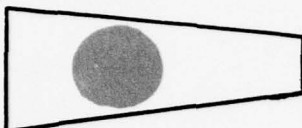


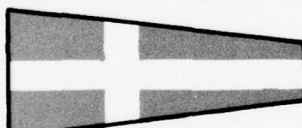
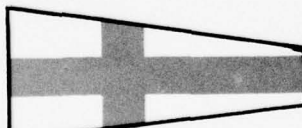



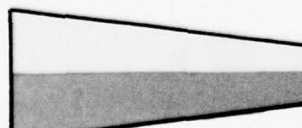
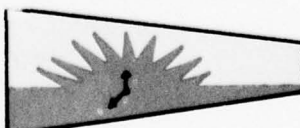


0 is Zero

Formation of
Japanese Zero
Aircraft

0

ZERO

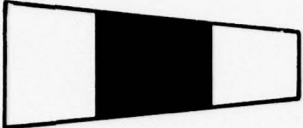
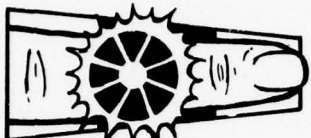

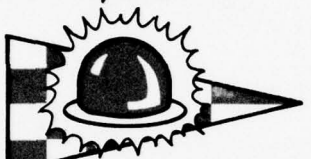





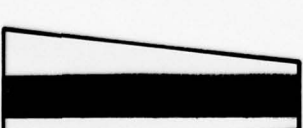



NUMERAL PENNANTS

PENNANT	MEMORY AID		MEANING	
			WRITTEN	SPOKEN
		"ZERO SPEED"	p ⁰	PENNANT ZERO
	{	ONE MEATBALL	p ¹	PENNANT 1
		"White Dot on Blue" is 2	p ²	PENNANT 2
		"TRICOLOR" (Red, White & Blue)	p ³	PENNANT 3
	{	"4 way intersection"	p ⁴	PENNANT 4
		Like Pennant 4 - only Colors reversed	p ⁸	PENNANT 8
		"BEEHIVE" Is FIVE	p ⁵	PENNANT 5
		"SIMPLE SIX" Just black and white	p ⁶	PENNANT 6
		"SUNSET AT SEVEN"	p ⁷	PENNANT 7
		"MODERN DESIGN" is NINE	p ⁹	PENNANT 9

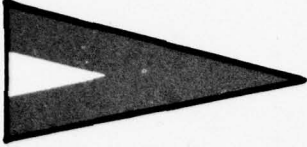
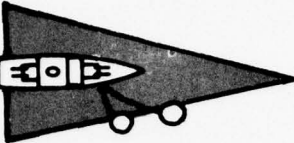
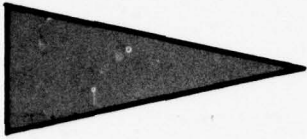


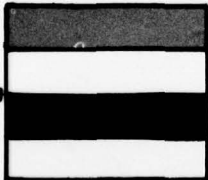
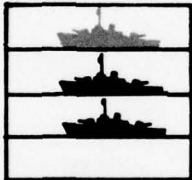
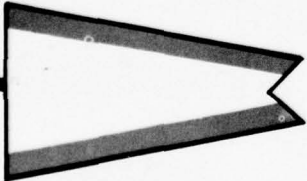
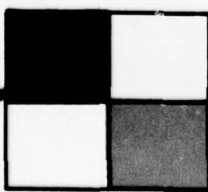
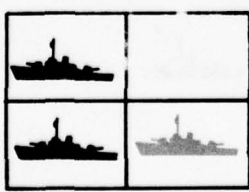

SPECIAL PENNANTS AND FLAGS

FLAG OR PENNANT	MEMORY AID		MEANING	
			WRITTEN	SPOKEN
		Blue and Gold are First Place	1st	FIRST SUB
		Silver is Second Place	2nd	SECOND SUB
		3 Parts to Pennant	3rd	THIRD SUB
		4 Corners in Pennant	4th	FOURTH SUB
		Story: Paul Revere got his ANSWER in CODE. 1 by land, 2 by sea The Red Coats are coming!	CODE OR ANSWER	CODE OR ANSWER
		Black Screens out all colors	SCREEN	SCREEN
		Corpen A turn where you follow the leader	CORPEN	CORPEN
		Turn together: White Wake; blue ocean	TURN	TURN

SPECIAL PENNANTS AND FLAGS

FLAG OR PENNANT	MEMORY AID	MEANING	
		WRITTEN	SPOKEN
		DESIG	DESIG
		EMERGENCY	EMERG
	Blue checkerboard → Like the November flag → No → <u>Negative</u>	NEGAT	NEGAT
		FORMATION	FORMATION
		INT	INTERROGATIVE
		PREP	PREP
	4 red lights on the <u>PORT</u> side of a ship	PORT	PORT
	2 green lights on the <u>STARBOARD</u> side of a ship	STARBOARD	STARBOARD

SPECIAL PENNANTS AND FLAGS

FLAG OR PENNANT	MEMORY AID		MEANING	
			WRITTEN	SPOKEN
		Red Sea Naval Stations	STATION	STATION
		Speed spills blood	SPEED	SPEED
		Smallest pennant - Sub-Division -	SUBDIV	SUBDIV
		A Division may consist of 4 ships - 4 stripes -	DIVISION	DIVISION
		The red edge is like the top edge of Division Flag This pennant is flown when the Division Commander is aboard the ship	BURGEE COMMAND	BURGEE COMMAND
		Stripes twice as thick as in Division Flag. A squadron may have twice the ships of a Division.	SQUAD	SQUAD
		The blue edge is like the top left edge of Squadron Flag. This pennant is flown when the Squadron Commander is aboard the ship	GROUP	GROUP

TAEG Report No. 60

APPENDIX C

BASIC EXERCISES FOR LEARNING SENTRY DUTIES
(ORDERS TO THE SENTRIES)

AN EASY WAY TO LEARN "ORDERS TO THE SENTRIES"

As a recruit you must learn the orders that deal with your duties as a sentry. You must also be able to recall each by number. This training supplement contains a memory aid called the peg word method which will make it easy for you to learn the essential point of each of the orders by number.

First you must spend a few minutes learning the peg words but they are easy to learn because they rhyme with the numbers one to ten.

One - Bun
Two - Shoe
Three - Tree
Four - Door
Five - Hive
Six - Sticks
Seven - Heaven
Eight - Gate
Nine - Line
Ten - Men

Now that you know the peg words you can use them to help you learn the sentry orders. As you look at an illustration, picture in your mind the peg word together with the essential point of the order to be learned. As you are asked to recall a particular order you should remember the same image.

One - Bun

1. Take charge of this post and all government property in view.



Sentry on giant bun overlooking post "taking charge" of post.

Two - Shoe

2. Walk my post in a military manner, keeping always on the alert, and observing everything that takes place withing sight or hearing.



Walking post in military manner wearing well
shined shoes.

Three - Tree

3. Report all violations of orders I am instructed to enforce.



George Washington chopping down cherry tree and then reporting "violation" to his father.

Four - Door

4. Repeat all calls more distant from the (guard house) quarterdeck than my own.



Sentry repeating call from guard house with door open.

Five - Hive

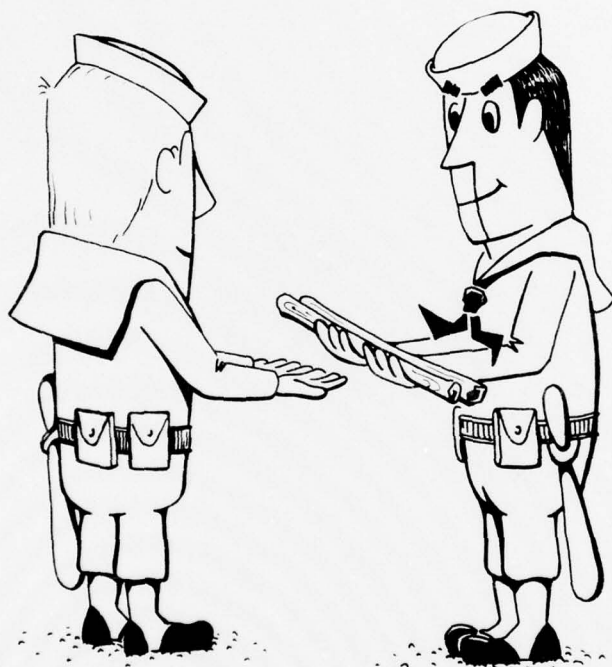
5. Quit my post only when properly relieved.



New sentry relieving old sentry who is being
chased by bees from hive.

Six - Sticks

6. Receive, obey and pass on to the sentry who relieves me, all orders from the commanding officer, command duty officer, officer of the day, officers of the deck, and officers and petty officers of the watch only.



New sentry being given orders (on scrolls that look like sticks) from the sentry relieving him.

Seven - Heaven

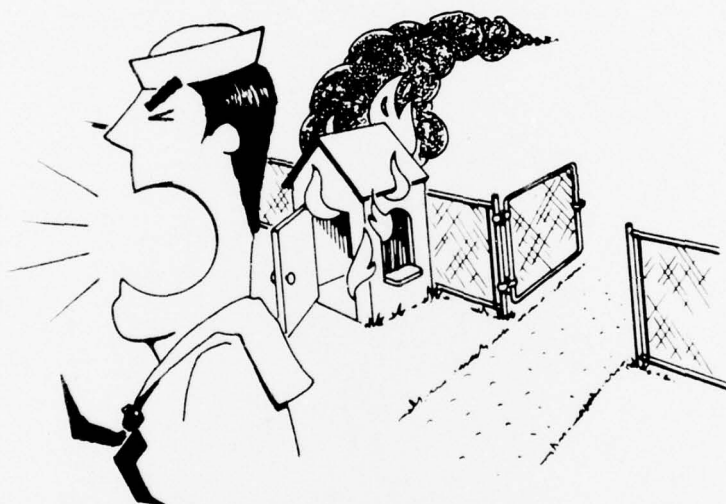
7. Talk to no one except in line of duty.



Silent angel/sentry.

Eight - Gate

8. Give the alarm in case of fire or disorder.



Sentry giving alarm with open gate behind him.

Nine - Line

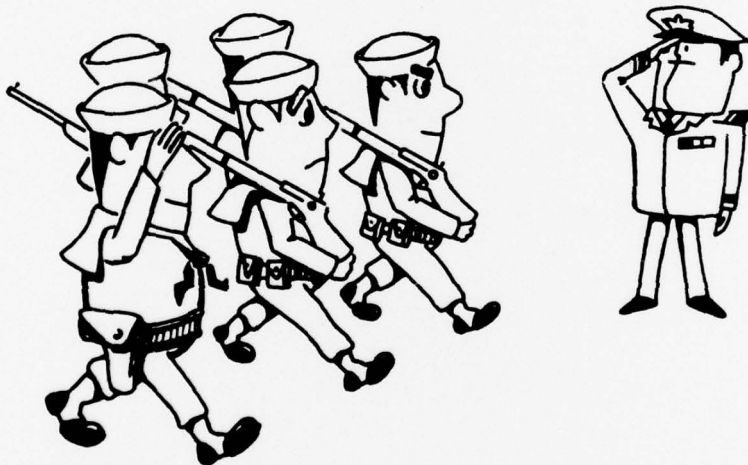
9. Call the (corporal of the guard) officer of the deck in any case not covered by instructions.



Sentry calling officer of the deck.

Ten - Men

10. Salute all officers and all colors and standards not cased.



Men saluting officer.

Eleven

11. Be especially watchful at night, and, during the time for challenging, challenge all persons on or near my post, and allow no one to pass without proper authority.



Two lamp posts in the form of an eleven light up the sentry post at night.

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